



The North American Transportation Security Center -- Deploy Project Collaboration Hardware/Software Infrastructure

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Kentucky Transportation Center
College of Engineering, University of Kentucky, Lexington, Kentucky

in cooperation with
Kentucky Transportation Cabinet
Commonwealth of Kentucky

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Research Report
KTC-19-32/FD04-1F

**The North American Transportation Security Center – Deploy Project Collaboration
Hardware/Software Infrastructure**

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Commonwealth of Kentucky

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June 2009

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1.0 KTC has developed a SharePoint site to support project team collaboration.

1.1 *Microsoft SharePoint server provides a rich collaboration environment for project teams.*

Microsoft SharePoint is a collection of [products](#) and [software elements](#) that include [Internet Explorer](#)-based [collaboration](#) functions, [process management](#) modules, search modules and a [document-management platform](#). SharePoint can be used to host web sites that access shared workspaces, information stores and documents, as well as host defined applications such as [wikis](#) and [blogs](#). All users can manipulate proprietary controls called "web parts" or interact with pieces of content such as lists and document libraries.

Microsoft Office SharePoint Server 2007 is built on and extends the functionality provided by Windows SharePoint Services 3.0. Windows SharePoint Services 3.0 employs operating system and database services to support requirements ranging from a team site for a workgroup, to large enterprise portal solutions serving hundreds of thousands of employees and staff, to a corporate Internet portal supporting millions of users.

Microsoft Office SharePoint Server 2007 builds on top of Windows SharePoint Services 3.0 to provide a comprehensive solution with enterprise-scale capabilities to meet critical needs such as managing content and business processes, and simplifying how people find and share information across boundaries.

Windows SharePoint Services 3.0 provides the following security-enhanced, scalable, reliable, high-performance capabilities for site management:

- **Storage** Allowing content such as documents (Office documents, PDFs, custom binary files), Web pages, lists, and other types of information to reside in a common data repository (Microsoft SQL Server™) with full data management capabilities, version control, metadata, and site-level search.
- **Security** Providing the essential elements of comprehensive security management by employing a range of authentication providers (for example, Kerberos, NTLM, basic, the Active Directory® directory service, LDAP, ASP.NET forms and Web single sign-on authentication), policy management, group management, and permission levels ranging from individual items in list to entire sites.
- **Management** Enabling centralized and delegated administrative facilities for Windows SharePoint Services sites from operational and application perspectives, in addition to ongoing site monitoring.
- **Deployment** Providing an architecture that supports flexible, distributed, and scalable deployment architectures, across Web and database servers; enabling configuration and site feature management.
- **Site Model** Providing a template-based infrastructure for deployment of custom sites, providing automated navigation and a consistent user interface – while allowing for extensive and flexible customization of site formatting and layout.
- **Extensibility** Providing a comprehensive application programming interface (API) that allows custom applications to be built on the Windows SharePoint Services architecture, employing use of XML Web services and SOAP, providing event handlers for cross-integration with other applications, and providing methods for migrating content into Windows SharePoint Services sites.

From a business perspective, Windows SharePoint Services 3.0 provides the following foundational collaboration features:

- Document collaboration
- Wikis and blogs
- RSS support
- Discussion boards
- Project task management
- Contacts, calendars, and tasks
- E-mail integration
- Integration with the 2007 Office system client applications
- Offline support for SharePoint lists and document libraries by using Office Outlook® 2007

These collaboration features are essential elements for building rich business productivity applications; Microsoft Office SharePoint Server 2007 employs and extends these features, while adding many more levels of capability in building rich business productivity solutions.

1.2 User rights can be established on a SharePoint portal.

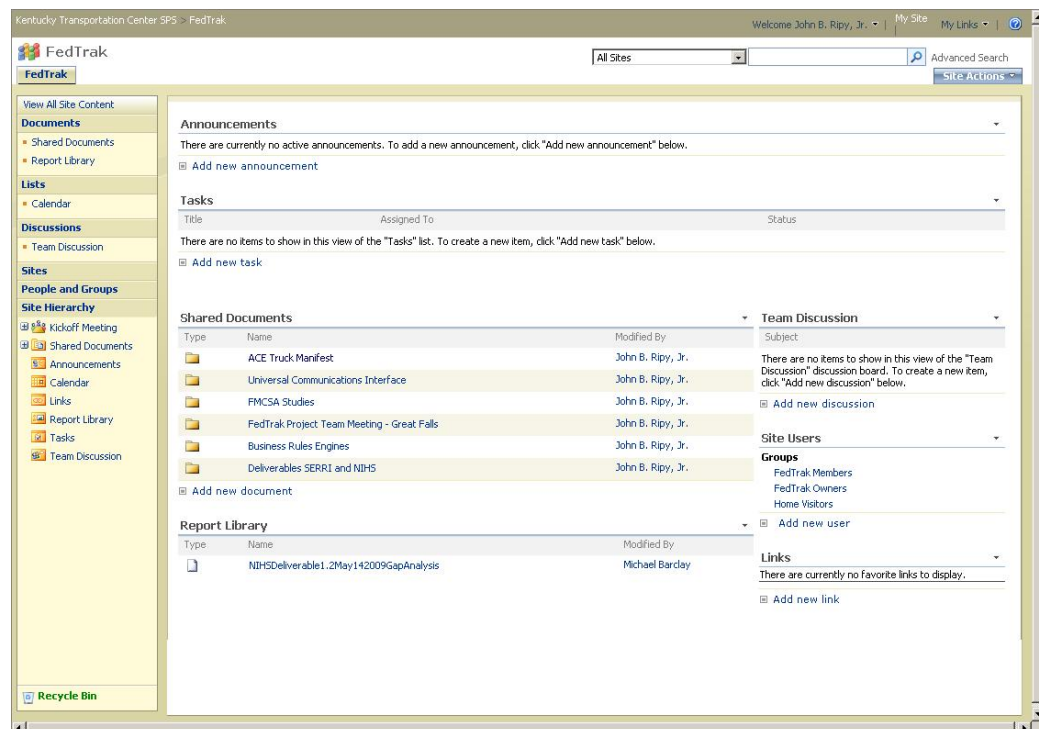
User rights can be established to reflect the different roles that people on a project team will play. Some users will have access to all the documents/features of a project team collaboration site while others will have restricted access. For example, a project manager might have rights to view project financial data but a software programmer might not.

The following individuals have or will be been granted rights on the KTC FedTrak project portal.

Dr. Joe Crabtree, KTC
 Doug Kreis, KTC
 John Ripy, KTC
 Jennifer Walton, KTC
 Candice Wallace, KTC
 Sherry Craycraft, KTC (finance/administration)
 Michael Barclay, Coldstream Digital
 Dan Downing, Advantage Factory
 Aaron Dutton, Advantage Factory
 Jonathan Granger, Advantage Factory
 Rob Torchon, Advantage Factory
 Matt Beranson, Advantage Factory
 Joe Elias, GDAIS
 Jim Ort, GDAIS
 Dennis Brundage, GDAIS
 Scott Falbo, GDAIS
 John Taylor, National Institute for Hometown Security

1.3 Project reference materials from the FedTrak Groove site have been loaded onto the SharePoint portal.

The KTC project team used a Microsoft Groove site as an initial repository of project documents. Those documents have been transferred to the FedTrak SharePoint project team portal. The following screenshots are from the project portal.



Kentucky Transportation Center SPS > FedTrak

Welcome John B. Ripoy, Jr. | My Site | My Links | Site Actions

FedTrak

This Site: FedTrak | serri

Results 1-9 of 9. Your search took 0.95 seconds.

Results by Relevance | View by Modified Date | Alert Me | RSS

- Deliverables **SERRI** and NIHHS
 Deliverables **SERRI** and NIHHS ... Deliverables **SERRI** and NIHHS
[http://cvoz.uky.edu/SiteDirectory/FedTrak/Shared Documents/Deliverables **SERRI** and NIHHS](http://cvoz.uky.edu/SiteDirectory/FedTrak/Shared Documents/Deliverables SERRI and NIHHS) - John B. Ripoy, Jr. - 6/1/2009
- FedTrak
 Deliverables **SERRI** and NIHHS
<http://cvoz.uky.edu/SiteDirectory/FedTrak - CHER\Administrator - 6/1/2009>
- Shared Documents
 Deliverables **SERRI** and NIHHS
<http://cvoz.uky.edu/SiteDirectory/FedTrak/Shared Documents/Forms/AllItems.aspx - CHER\Administrator - 6/1/2009>
- Home - Kickoff Meeting
 The **SERRI** Project (background)
<http://cvoz.uky.edu/SiteDirectory/FedTrak/kickoff/default.aspx - 6/1/2009>
- Kickoff Meeting - Agenda
 The **SERRI** Project (background)
<http://cvoz.uky.edu/SiteDirectory/FedTrak/kickoff/Lists/Agenda/AllItems.aspx - CHER\Administrator - 6/1/2009>
- FedTrak Project Deliverables.docx
 1.1 Update **SERRI** analyses - PL 110-53 and TSA input - report
[http://cvoz.uky.edu/SiteDirectory/FedTrak/Shared Documents/Deliverables **SERRI** and NIHHS/FedTrak Project Deliverables.docx - 26KB - beardog - 6/1/2009](http://cvoz.uky.edu/SiteDirectory/FedTrak/Shared Documents/Deliverables SERRI and NIHHS/FedTrak Project Deliverables.docx - 26KB - beardog - 6/1/2009)
- FedTrak Meeting Agenda.docx
 The **SERRI** project (background)
<http://cvoz.uky.edu/SiteDirectory/FedTrak/Shared Documents/FedTrak Project Team Meeting - Great Falls/FedTrak Meeting Agenda.docx - 36KB - beardog - 6/1/2009>
- SERRI** Final Report
SERRI Final Report.pdf ... **SERRI** Final Report.pdf
<http://cvoz.uky.edu/SiteDirectory/FedTrak/Shared Documents/Forms/DispForm.aspx?ID=12 - 22MB - John B. Ripoy, Jr. - 6/1/2009>
- The **SERRI** Project (background)
 The **SERRI** Project (background) ... The **SERRI** Project (background)
<http://cvoz.uky.edu/SiteDirectory/FedTrak/Kickoff/Lists/Agenda/DispForm.aspx?ID=3 - John B. Ripoy, Jr. - 6/1/2009>

Kentucky Transportation Center SPS > FedTrak

Welcome John B. Ripoy, Jr. | My Site | My Links | Site Actions

FedTrak

All Sites | Advanced Search

FedTrak > Team Discussion > New Item

Team Discussion: New Item

OK Cancel

Attach File | Spelling... * indicates a required field

Subject *

Body

Click for help about adding HTML formatting.

OK Cancel

2.0 The project team will use development versions of Microsoft and ESRI software to build FedTrak systems.

2.1 As a Microsoft partner firm, Coldstream Digital holds production licenses for Microsoft office products and Microsoft server products.

Coldstream Digital is a Microsoft partner company, and has production licenses for almost all Microsoft server products. These licenses cover all activities that will take place under this contract.

Specifically, Coldstream Digital holds a Microsoft Action Pack subscription and BizSpark status with Microsoft. The software licenses covered by the Action Pack Subscription and BizSpark membership are described below.

Microsoft BizSpark Membership

Microsoft selected Coldstream Digital as a Bizspark partner in 2008. BizSpark is a global program designed to accelerate the success of early stage Startups. BizSpark provides entrepreneurs fast and easy access to current full-featured Microsoft development tools and productions licenses of server products, with no upfront costs and minimal requirements. BizSpark provides the following software, support and visibility to high-potential Startups:

- All the software included in the Microsoft® Visual Studio® Team System Team Suite (VSTS) with MSDN® Premium subscription
- Expression® Studio Version 2
- VSTS Team Foundation Server (standard edition)
- Production use rights to host a "software as a service" solution (developed during participation in the BizSpark Program, on any platform) over the Internet, with regard to the latest versions of Microsoft products including:
 - Microsoft Windows Server® (all editions up to and including Enterprise)
 - Microsoft SQL Server® (all editions)
 - Microsoft Office SharePoint® Portal Server
 - Microsoft System Center
 - Microsoft BizTalk® Server
 - Microsoft Dynamics® CRM

In addition to the core program offering, BizSpark startups will be eligible for other Microsoft offerings, such as Microsoft Azure™ Services Platform.

Microsoft Action Pack Subscription

Windows Software

Current Welcome Kit	Number of Licenses	Number of CALs
Windows Vista Business, 32-bit, in all supported languages ^{1,2}	10	Not applicable
Windows Vista Business, 64-bit ²	Not applicable	Not applicable
Windows Vista Business with Service Pack 1 (SP1), 32-bit and 64-bit	10	Not applicable
Windows Vista Ultimate with SP1, 32-bit and 64-bit, in all supported languages ¹	1	Not applicable
Windows Live OneCare Trial	10	Not applicable
Microsoft Virtual PC 2007 ⁵	10	Not applicable

Microsoft Office System Software

Current Welcome Kit	Number of Licenses	Number of CALs
Microsoft Office Enterprise 2007, in all supported languages ¹	10	Not applicable
Microsoft Office Enterprise 2007 SP1, in all supported languages ^{1,3}	Not applicable	Not applicable
Microsoft Office Outlook 2007 with Business Contact Manager	10	Not applicable
Microsoft Office Project Professional 2007, in all supported languages ¹	10	Not applicable
Microsoft Office Visio Professional 2007, in all supported languages ¹	10	Not applicable
Microsoft Office SharePoint Designer 2007, in all supported languages ¹	10	Not applicable
Microsoft MapPoint 2009 Standard Edition ⁴	10	Not applicable
Microsoft Office Communicator 2007 R2 (client), in all supported languages ¹	10	Not applicable

Server Software

Current Welcome Kit	Number of Licenses	Number of CALs
Windows Small Business Server 2008 Standard Edition, in all supported languages ¹	1	10
Windows Essential Business Server 2008 Standard Edition, in all supported languages ¹	1	10
Windows Server 2008 Standard (32-bit and 64-bit), in all supported languages ¹	1	10
Windows Server 2008 Terminal Server client access licenses (CALs)	Not applicable	10
Windows Server 2003 Web Edition	1	Not applicable
Windows Home Server, in all supported languages ¹	1	Not applicable
Microsoft Hyper-V Server 2008 ⁵	10	Not applicable
Microsoft SQL Server 2008 Standard Edition, in all supported languages ¹	1	10
Microsoft Exchange Server 2007 Standard Edition SP1, in all supported languages ¹	1	10
Microsoft Office SharePoint Server 2007 Enterprise Edition, in all	1	10

supported languages ¹		
Microsoft Office Communications Server 2007 R2 Standard Edition, in all supported languages ¹	1	10
Office Communications Server 2007 Standard Edition (Microsoft Speech Server role)	1	10
Microsoft Virtual Server 2005 R2 Enterprise Edition, in all supported languages ¹	10	Not applicable
Microsoft Virtual Server 2005 R2 Enterprise Edition SP1, in all supported languages ^{1,3}	Not applicable	Not applicable

Security Software

Current Welcome Kit	Number of Licenses	Number of CALs
Microsoft Forefront Client Security, in all supported languages ¹	1	10
Microsoft Internet Security and Acceleration Server 2006 Standard Edition, in all supported languages ¹	1	Not applicable
Internet Explorer Administration Kit 8 Release Candidate 1 ⁵	Not applicable	Not applicable

IT Management Software

Current Welcome Kit	Number of Licenses	Number of CALs
Microsoft System Center Data Protection Manager 2007, multilanguage version, 32-bit	1	Not applicable
System Center Data Protection Manager 2007, multilanguage version, 64-bit	1	Not applicable
Microsoft System Center Data Protection Manager 2007 SP1, multilanguage version, 32-bit ⁵	Not applicable	Not applicable
Microsoft System Center Data Protection Manager 2007 SP1, multilanguage version, 64 bit ⁵	Not applicable	Not applicable
Microsoft System Center Essentials 2007, in all supported languages ¹	10	Not applicable
Microsoft System Center Essentials 2007 SP1 ⁵	Not applicable	Not applicable

Microsoft Dynamics Software

Current Welcome Kit	Number of Licenses	Number of CALs
Microsoft Dynamics CRM 4.0, Workgroup Server, in all supported	5	Not applicable

languages⁶

2.2 The KTC project team has access to production licenses for the Microsoft/ESRI server products underlying the Fusion Core system.

In July 2009, Microsoft/ESRI will introduce the Fusion Core product for State fusion centers. Fusion Core is a collaborative initiative between Microsoft and ESRI, the leading GIS software firm in the world. Fusion Core will allow State fusion centers to integrate their existing data holdings to create actionable security intelligence.

KTC developed a strategic relationship with the Microsoft/ESRI Fusion Core team for two reasons.

1. The Microsoft/ESRI tools used to build Fusion Core are the same products that the KTC project team will use to build FedTrak. KTC will leverage the investment made by Microsoft and ESRI to integrated the companies' software stacks.
2. FedTrak will tie directly to state fusion centers. The domain expertise of the Fusion Core team will be valuable to the KTC project team as it builds functionality aimed at state fusion center staff.

Appendix A contains a fact sheet on Fusion Core.

At the heart of Fusion Core is an integrated Microsoft/ESRI software stack. Due to its strategic relationship with Microsoft, the KTC project team will have access to a production license the Fusion Core software stack. The stack includes the following.

- Office Performance Point Server 2007
- Office Performance Point CAL
- SharePoint Server 2007
- SharePoint Standard CAL
- SharePoint Enterprise CAL
- SQL Server 2008 Enterprise (2) (Per CPU Licensing)
- Windows Server 2008 Enterprise (2) (X64 version)
- Office 2007 Professional
- System Center Virtual Machine Manager (Used to manage virtual machines)
- ESRI ArcGIS Advanced 9.3 Enterprise Server (Licensed per pack of 4 cores; includes 50 mobile deployments)
- ESRI ArcInfo 9.3
- ESRI ArcGIS Explorer
- ESRI 2D Viewer

3.0 KTC is procuring a high-end server at project initiation to meet the project team's development and test needs.

3.1 The KTC project server will be capable of supporting a Microsoft/ESRI Fusion Core installation.

KTC is procuring a high-end server to meet the project team's development and test needs. In addition to the project team's needs, the server will be configured to support a Fusion Core installation. Fusion Core requires a high-end server, and meeting the Fusion Core installation needs will more than satisfy FedTrak project team requirements.

The minimum hardware configuration for a Fusion Core installation is:



- A quad processor server with four cores per processor
- A minimum of 24GB of RAM (with 32GB of RAM ideal)
- 2TB of network attached storage

3.2 KTC is purchasing the project server off UK's pre-negotiated schedule with Dell.

The University of Kentucky has a master purchasing schedule with Dell. Pre-negotiated pricing on the schedule will allow KTC to obtain the lowest pricing available for the FedTrak project team server. **Appendix B** contains the specifications/pricing for the project server KTC intends to purchase from Dell.

3.3 Virtualization software will allow the project team to install a number of server software products on a single server.

The KTC project team will use the Microsoft Hyper-V Server 2008 as its virtualization tool. This allows the project team to load multiple server products onto a single high-end project server.

4.0 The development/test server will be hosted at the University of Kentucky or at the Network Operations Center/Valley Oak Technology complex in Somerset.

The FedTrak project server will be hosted at the University of Kentucky or the Network Operations Center (NOC) at the Valley Oak Technology Complex in Somerset. The NOC is operated by the Center for Rural Development (CRD). Doug Kreis and Michael Barclay met with Larry Combs of CRD to discuss hosting options on June 22nd. KTC will make a hosting location decision by July 15th. Hosting expenses are expected to run about \$350/month if the server is placed at the NOC. Hosting expenses and expenses associated with procurement of a COTS business rules engine are expected to consume KTC's remaining equipment/licensing project budget.

5.0 The project team will use a development version of a COTS business rules engine.

In the FedTrak system, the FedTrak Central Tracking Unit will feed data on each Tier 1 HSSM shipment to a risk engine to generate a risk score at gate out. The risk score of the shipment will be constantly updated as the truck moves from gate out to gate in.

The FedTrak risk engine will be built using a COTS business rules product. Deliverable 7 calls for the project team to integrate a COTS business rules product into FedTrak and to populate it with a simple set of rules. A number of commercial business rule products are available for use as the FedTrak risk engine, however, the decision on which business rules product will not be made until at least month 6 of the project. Even with a development version of the business rules product, KTC expects the project team to incur some licensing expense. A separate, smaller server may also be needed for business rules software.



Appendix A

Microsoft/ESRI Fusion Core Factsheet

Fusion Framework

Enhance information sharing and security with a mission-critical technology architecture and solution for fusion centers

Intelligence fusion for prevention, preparedness, and response

The 9/11 Commission Report made it clear that because information was not shared and analysis was not conducted, preventive action was not taken and the nation was left unprepared. The tragic aftermath of Hurricane Katrina also highlighted the need for collaboration between federal, state, and local governments and the private sector—to gather, share, and analyze information that results in actionable intelligence and leads to safer communities.

Connecting silos of information

Barriers to communication occur both horizontally and vertically—between and within intelligence agencies and also between and within local, state, and federal levels of government. Collaboration between so many different types of entities requires that people get the information they need but not more than they are authorized to have.

As a joint project between the Department of Homeland Security and the US Department of Justice, many states now have fusion centers to gather information from both government sources and the private sector. Fusion centers should promote information sharing—at the federal level, between agencies such as the CIA, FBI, and Department of Justice, and at the state and local level—towards the objective of creating one complete picture that aids situational awareness, planning, prevention, and response to an incident. However, fusion center directors and analysts continue to experience frustration with:

- The inability to exchange information with internal and external partners in an effective and timely manner.

- Difficulties distilling large volumes of data into relevant and actionable intelligence.
- Ineffective collection and management of information from disparate sources through a single portal.
- Geographic information system (GIS) tools that are challenging to learn and use, and difficulties getting GIS data to those who need it.

The Microsoft commitment to a replicable fusion center IT architecture

Microsoft is committed to developing a referenceable and replicable mission-critical architecture—for fusion centers and for connecting fusion centers together. As objectives for this architecture, Microsoft used five of the 18 Guidelines and Key Elements found in the Department of Homeland Security/Department of Justice “Fusion Center Guidelines” (these five relate to IT support):

1. Create a collaborative environment for intelligence and information sharing.
2. Leverage existing databases and systems to maximize information sharing both internally and externally.
3. Create seamless information exchange using NIEM (National Information Exchange Model) to integrate existing systems.
4. Develop appropriate security measures to help ensure access to networks and systems.
5. Integrate technology, systems and people through a senior leader vision, operator analyst driven IT architecture

In partnership with the Illinois Statewide Terrorism Intelligence Center (STIC), Microsoft designed a technology platform and architecture for sharing law enforcement intelligence that fills a critical void and could make the world a safer place.

Fusion Framework

The Fusion Framework architecture, based on the requirements-gathering alliance with the Illinois State Police and other law enforcement organizations, delivers a solution tailored to state and local intelligence and to fusion center missions and practices, and is interoperable with existing technology infrastructures.

The Microsoft team designed an interoperable solution that moves information smoothly from **intake** to **analysis** to **dissemination** in a multiple-agency, multilevel environment. This solution also integrates with existing assets and domain-specific applications to provide:

- **Consolidated views of intelligence data.** Enables collection, intake, workflow management, collaborative analysis, dissemination, auditing, and the capture of business performance metrics with a consistent user interface across multiple applications.
- **Easy sharing of data among intelligence analysts.** A collaborative environment facilitates reliable information exchange both internally and externally.
- **Granular data access control.** Access to networks, systems, and information is better controlled and monitored; supports multiple information access eligibilities of government agencies and private sector entities.
- **Reduced manual processes.** Emulates and improves the ways organizations perform work, and magnifies personnel productivity.
- **Rapid deployment capability.** Offers guidance, best practices, and a technology roadmap to assist in planning.
- **Adaptable and interoperable.** Offers flexible adaptation to new missions and unforeseen operational challenges; defined integration points can be used for localization.

ArcGIS for Situational Awareness

ESRI (www.esri.com), a partner in Fusion Framework, provides the GIS tools needed to equip fusion centers with the best possible methods of displaying and analyzing data. As the market leader in GIS, ESRI software is used by more than 21,000 public safety agencies and each of the 200 largest cities in the United States.

The ArcGIS® Situational Awareness Bundle included in the Fusion Framework provides a complete framework for geospatial intelligence and decision-making. It also includes terabytes of pre-rendered nationwide and worldwide street and transportation data, place-names, administrative boundaries, raster imagery, topographic maps, shaded relief imagery, and elevation data.

**“GIS is infectious.
Once people see their
data visualized on a
map, they love it.”**

**— Brian Egnitz,
GIS program manager,
Massachusetts State Police**

Fusion Core Solution

Soon to be available as a rapid deployment solution, Fusion Core Solution is a pre-configured package of software and hardware that provides fast data management, visualization, and geospatial capabilities to help produce actionable intelligence. System components include:

- Microsoft® Office SharePoint® Server 2007
- Microsoft SQL Server® 2008 Enterprise
- Windows Server® 2008 Enterprise
- Systems Center Virtual Machine Manager
- Microsoft Windows Vista® Enterprise
- Microsoft Office 2007 Enterprise
- Bing™ Map for Enterprise (Used to be Virtual Earth™)
- ESRI ArcGIS Situational Awareness Bundle

How to get started

Contact your [Microsoft Fusion Framework team \(fusion@microsoft.com\)](mailto:fusion@microsoft.com) to discuss your operational and technology requirements and to help you evaluate Fusion Framework for your information analysis and collaboration needs.

For more information, please visit:
www.microsoft.com/fusion

Appendix B

Specifications/Pricing for KTC Project Server

Dell recommends Windows Vista® Business.

View/Print Cart

 [Print Page](#)

University of Kentucky

E-quote Number: 1000333373701**Saved By:** John Ripy**Phone Number:**

(859) 257-7536

jripyjr@gmail.com

Purchasing Agent:**Saved By:** Wednesday, July 01, 2009 **Notes/Comments:****Expires On:** Sunday, August 30, 2009 **Additional Comments:****Description****PowerEdge R905**

Date & Time: July 01,2009 6:36 AM CST

SYSTEM COMPONENTS**PowerEdge R905**

R905 2x Quad Core Opteron 8382, 2.6GHz, 4x512K Cache, HT1, No Operating System

Qty 1

Unit Price \$13,799.16

Catalog Number:**25 E172****Module****Description**[Show Details](#)**PowerEdge R905**

R905 2x Quad Core Opteron 8382, 2.6GHz, 4x512K Cache, HT1

Operating System

No Operating System

Additional Processor

Upgrade to Four Quad Core Opteron 8382 2.6GHz

Memory

64GB Memory, 16X4GB, 667MHz

Keyboards, Mice, Displays and Related Devices

Keyboard and Optical Mouse, USB, Black, English, with 17 LCD Monitor

Optional Feature Upgrades for Integrated NIC Ports

LOM NICs are TOE, iSCSI Ready (R905/805)

Primary Hard Drive

1TB 7.2K RPM Near-Line SAS 3Gbps 3.5-in HotPlug Hard Drive

Modem / DRAC

Dell Remote Access Card, 5th Gen, R905

Optional Optical Drive

DVD-ROM Drive, Internal

Bezel

PowerEdge R905 Active Bezel

Backplane	1X5 SAS Backplane, for 3.5 Inch SAS Hard Drives only, PowerEdge R905
Documentation	PowerEdge R905 No Documentation
2nd Hard Drive	1TB 7.2K RPM Near-Line SAS 3Gbps 3.5-in HotPlug Hard Drive
Internal Storage Controller & Configuration	Internal PERC RAID Controller, 4 to 8 Hard Drives in RAID 6 config
Chassis Configuration	Dell RapidRails for use in Dell Racks, Square Holes
Hardware Support Services	3 Year ProSupport for IT 4HR 7x24 Onsite: Non Mission Critical
Installation Services	No Installation
Power Cords	2x Power Cord, NEMA 5-15P to C14, 15 amp, wall plug, 10 feet / 3 meter
Integrated Network Adapters	4x Broadcom® NetXtreme II 5708 1GbE Onboard NICs with TOE
3rd Hard Drive	1TB 7.2K RPM Near-Line SAS 3Gbps 3.5-in HotPlug Hard Drive
4th Hard Drive	1TB 7.2K RPM Near-Line SAS 3Gbps 3.5-in HotPlug Hard Drive
5th Hard Drive	1TB 7.2K RPM Near-Line SAS 3Gbps 3.5-in HotPlug Hard Drive
Uninterruptible Power Supply (UPS)	3000VA UPS 208 Volt, 2U Rack Mount

TOTAL: \$13,799.16

Total Price	
Sub-total	\$13,799.16
Shipping & Handling	\$0.00
Tax	--
Total Price¹	--

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